REMARKS

Claims 1, 28, 33, 34, 38 and 39, as amended, remain herein. Claims 22, 23, 27, 30, 32 and 35-37 have been cancelled without prejudice. Claims 1 and 34 have been amended. New claims 38 and 39 have been added. Support for the amendments and the new claims may be found throughout the specification (see, e.g., original claims; page 48, line 8 to page 50, line 27; and page 52 of the specification).

1. Claims 22, 23, 30 and 35-37 were rejected under 35 U.S.C. § 102(b) over Keisuke et al. JP 2002/367784. Claims 22, 23, 30 and 35-37 have been cancelled thereby mooting this rejection.

2. Claims 1, 22, 23, 28, 30 and 32-37 were rejected under 35 U.S.C. § 103(a) over Tanaka et al. U.S. Patent 6,107,734 in view of Mori U.S. Patent 6,215,245 and Tsutsui et al. U.S. Patent Application Publication 2003/0127967. Claims 22, 23, 30, 32 and 35-37 have been cancelled thereby mooting the rejection of those claims.

Applicants' claim 1 recites an organic electroluminescent device comprising: at least two or more emitting layers between an anode and a cathode, and an intermediate electrode layer between emitting layers, the intermediate electrode layer being a single layer or a multilayer structure, at least one of the layers comprising a semiconductive material, the semiconductive material comprising at least one conductive oxide comprising a transition metal selected from the group consisting of NbO_x, LaO_x, NdO_x, SmO_x, EuO_x, MoO_x, ReO_x, WO_x, OsO_x, IrO_x and PtO_x, wherein x is 0.2 to 5.

The Office Action admits that Tanaka does not disclose applicants' claimed semiconductive material comprising at least one conductive oxide comprising a transition metal selected from the group consisting of NbO_x, LaO_x, NdO_x, SmO_x, EuO_x, MoO_x, ReO_x, WO_x, OsO_x, IrO_x and PtO_x, wherein x is 0.2 to 5. The Office Action alleges that Mori teaches that IrO_2, MoO_2, NbO, OsO_2, ReO_2, or ReO_3 are suitable compounds for use in a cathode, and that a person of ordinary skill in the art would be motivated to combine the oxides of Mori with the device of Tanaka.

Contrary to the assertion in the Office Action, a person of ordinary skill in this art would not be motivated to combine Mori and Tanaka. Tanaka discloses an intermediate layer including a layer for injecting holes and a layer for injecting electrons (Tanaka, column 7, lines 42-46). Mori, on the other hand, teaches the use of conductive oxides as stabilizing compounds for low work function sodium or potassium cathodes. Contrary to the suggestion in the Office Action, Mori does not say that conductive oxides enhance the injection efficiency of a cathode. In addition, Mori states that such compounds may be used "if their conductivity is equivalent to those of pure metals." Mori, column 3, lines 49-50. Thus, Mori discloses conductive materials, not semiconductive materials. Thus, if a person of ordinary skill in the art were to replace P-type CuO with the conductive material of Mori, the hole injection property of the intermediate conductive layer would be significantly affected. In addition, a person of ordinary skill in this art would not be motivated to use a conductive material for use in a cathode, in a semiconductive layer which has a dual function of supplying electrons and holes.

The present application claims a semiconductive material comprising at least one conductive oxide comprising a transition metal selected from the group consisting of NbO_x,

LaO_x, NdO_x, SmO_x, EuO_x, MoO_x, ReO_x, WO_x, OsO_x, IrO_x and PtO_x, wherein x is 0.2 to 5.

Applicants' specification explains that:

> The organic EL device (A) comprises at least two or more emitting layers between an anode and a cathode, and an intermediate electrode layer interposed between emitting layers, the intermediate electrode layer comprising a semiconductive material having a resistivity of 0.001 to 10,000 Ω.cm.
>
> The intermediate electrode layer can generate both electrons and holes since it comprises a semiconductive material with the above resistivity. Thus it can sufficiently supply carriers to either one of the two emitting layers on both the surfaces thereof.
>
> As shown in FIG. 1, an intermediate electrode layer 6 injects holes from a surface A contact with an emitting layer 4 on a cathode 2 side, while it injects electrons from a surface B contact with an emitting layer 8 on a anode 10 side.
>
> The intermediate electrode layer has good contact with the emitting layers and the other organic layers and the organic EL device of the invention can thus have a longer life time than conventional organic EL devices.
>
> When a material of the intermediate electrode layer has too small a resistivity, current tends to leak. When it has too large a resistivity, voltage increases at the driving time. Preferred then is a semiconductive material having a resistivity of 0.001 to 10,000 Ω.cm, particularly preferably 0.01 to 100 Ω.cm. The intermediate electrode layer preferably has a thickness of 0.1 to 100 nm to function as a thin film. Too thick the thickness thereof may cause an increase in driving voltage.

Applicants' specification, page 11, line 8 to page 12, line 1 (emphasis added here).

Furthermore, the results of a claimed combination are not obvious if they are unexpected. MPEP § 2141(V). In this case, Mori suggests using oxides as stabilizing agents, and a person of ordinary in this art could not have expected achieving applicants' superior organic electroluminescent device by using Mori's oxides in Tanaka's intermediate layer.

Applicants' organic electroluminescent device achieves superior efficiency and lifetime. Compare applicants' Example 1 with Comparative Example 1 in Table 1 at page of applicants' specification. Comparative Example 1 is similar to Tanaka and includes an intermediate layer of

Alq:Li and ITO (Alq:Li is labeled as an electron injection layer in applicants' specification, but is part of the intermediate layer in Tanaka). Evidence that the claimed invention yields unexpectedly improved properties, or properties not present in the prior art rebuts an obviousness rejection. See In re Dillon, 919 F.2d 688, 692-93 (Fed. Cir. 1990); MPEP § 2145. Thus, applicants' organic electroluminescent device is not obvious over Tanaka.

Nor does Tsutsui teach or suggest what is missing from Tanaka. Tsutsui discloses organic semiconductors. Tsutsui also discloses conductive metallic thin films and metallic oxide thin films. However, Tsutsui says nothing about applicants' claimed semiconductive material comprising a conductive oxide comprising a transition metal selected from the group consisting of NbO_x, LaO_x, NdO_x, SmO_x, EuO_x, MoO_x, ReO_x, WO_x, OsO_x, IrO_x and PtO_x.

Claim 39 is further patentable because none of Tanaka, Mori and Tsutsui discloses applicants' claimed electron injecting layer formed on the anode side of an intermediate layer, wherein the electron injecting layer comprises an alkali metal compound or a reducing dopant.

Thus, none of Tanaka, Mori and Tsutsui discloses or suggests applicants' claimed invention. In addition, there is no disclosure or suggestion in any of Tanaka, Mori, Tsutsui or anything else in this record that would have suggested the desirability of modifying or combining any portions thereof effectively to anticipate or render obvious applicants' claimed invention. Applicants respectfully request reconsideration and withdrawal of this rejection.

3. Claim 27 was rejected under 35 U.S.C. § 103(a) over Tanaka in view of Forrest et al. U.S. Patent 5,703,436. Claim 27 has been cancelled thereby mooting this rejection.

Accordingly, all claims are now fully in condition for allowance and a notice to that effect is respectfully requested. The PTO is hereby authorized to charge/credit any fee deficiencies or overpayments to Deposit Account No. 19-4293. If further amendments would place this application in even better condition for issue, the Examiner is invited to call applicant's undersigned attorney at the number listed below.

Respectfully submitted,

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